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CRUSTACEA OF THE CRETACEOUS FORMATION OF NEW JERSEY.

BY HENRY A. PILSBRY.

From the earliest exploitation of the Cretaceous beds of New Jersey, remains of crustacea have been encountered by various observers, most of whom contented themselves with merely mentioning the occurrence of crabs' claws. These remains have until now escaped scientific description.

The first notice of crustacean fossils from the State, so far as I know, is contained in Vol. I, part 2, pp. 195–198, of the *Annals of the Lyceum of Natural History of New York* (1824), where Dr. J. Van Rensselaer gives a brief account and figures of four supposed species from " the triangular peninsula comprised between the ocean and the Delaware and Raritan rivers." The species are not named, and from the information given cannot be identified with certainty, but Nos. 1 and 3 may be *Callianassa mortoni*, and No. 4 is possibly *C. conradi.*

Dr. S. G. Morton, in the *American Journal of Science and Arts*, XVII, No. 2, p. 287 (1830), notices Van Rensselaer's work, and mentions the finding of *Astacus* remains in Delaware; paraphrasing his remarks in the *Synopsis of Organic Remains of the Cretaceous Group of the U. S.*, p. 74 (1834).

The collection of the Academy of Natural Sciences of Philadelphia contains many specimens from the deep cut of the Chesapeake and Delaware canal, Delaware, and from Monmouth and Burlington counties, N. J., together with numbers without locality further than " Cretaceous, New Jersey." During the last few years various members of the Academy have added specimens from Lenola, N. J., a locality unknown to the earlier collectors of Cretaceous fossils.

It is noteworthy that all the specimens thus far seen are from the " Lower Marl " beds; none have come to my notice from the Middle or Upper Marls.

I am indebted to Mr. Charles W. Johnson, Curator of the Wagner Free Institute of Science, for various references and the use of material in the museum in his charge, including specimens collected by William Wagner, Thomas H. Montgomery, Jr., and himself.

CALLIANASSA Leach.

The glauconitic sands of the New Jersey Cretaceous are ill-adapted for the preservation of delicate structures, and therefore only the hard large claws of these soft-bodied Macrura are found. Most of the species described from the Cretaceous, Eocene and Miocene of Europe are likewise based upon chelæ.

In the United States one Eocene species has been described, *C. ulrichi* White,[1] from specimens collected by Mr. E. O. Ulrich near Little Rock, Ark., in a bed at first supposed to be Cretaceous. The specimens before me were collected by Mr. C. W. Johnson at Mabelvale, Ark. The propodite in this species is short and squarish, much as in *C. conradi;* the lower border is somewhat crenate, and well-preserved specimens show a tuberculate tract on each side behind the commissure between the fingers. The hand is compressed, as in *C. conradi.*

In Europe the fossil species from Mesozoic and Tertiary strata are numerous and an excellent account of them has been given by Milne-Edwards,[2] while notices and descriptions of various species occur in the works of many other authors. The older species are very similar to living forms, weak and soft-bodied burrowers in the sand, and yet the genus has outlived most of its companions on the shores of the Cretaceous seas. There is nothing like being adapted to your circumstances.

Our species apparently belong to that division of the genus in which the fingers are of equal length, but they are clearly distinct from any described European form.

Callianassa mortoni n. sp. Pl. I, figs. 1-7.

Propodite (figs. 1–4) rhombic, its breadth about two-thirds the length, the outer face (fig. 1) very convex, the greatest convexity posterior and nearer the upper side. Surface nearly smooth, usually showing a series of four distant punctures extending backward from the root of the fixed finger, and two on the other or more convex side; *the posterior margin abruptly falling* near the joint, a prominence bearing a group of small tubercles at the summit before the deflection. Inner surface or palm (fig. 2) much less convex, becoming concave near the lateral margins, nearly smooth, the anterior margin slightly excavated between the root of the fixed finger and the dactylopodite, and bordered there with a short row of small tubercles. On the median portion of the palm there are two punctures, marking it off into thirds longitudinally. Lateral margins of the propodite acute, closely, finely and regularly crenulate; the lower margin straight, with a row of punctures along the inner side but extremely near the edge, and another less close to the edge outwardly; upper margin deeply curved down posteriorly, produced into a deflexed lobe, and similarly margined with spaced punctures. Fixed finger about one-third the total length of the whole propodite, curved at the tip, finely crenate along the grasping margin when unworn, and with a blunt median tooth.

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[1] C. A. White, *Proc. U. S. Nat. Mus.*, III, 1880, p. 161; IV, 1881, p. 137, Pl. 1, figs. 10, 11 (left propodite); G. H. Harris, *Ann. Rep. Geol. Surv. Arkansas*, II, 1892, p. 36, Pl. 1, fig. 2a, 2b (left hand).

[2] *Annales des Sciences Naturelles*, 4 ser., XIV, Zool., p. 301 (1860); a supplement in *Nouv. Arch. du Mus.*, 1870, Vol. VI.

Dactylopodite with two contiguous crenulate carinæ along its outer edge.

Carpopodite (Pl. I, figs 5, 6) somewhat shorter than the palmar surface of the propodite, equally convex inside and out, turgid anteriorly, its outer face with an oblique groove bordered with small tubercles near the distal lower angle. Posterior upper angle produced backward in a rather slender process.

Meropodite (Pl. I, fig. 7) subtriangular in section, the upper keel strongly arched, lower keel nearly straight and more strongly serrate, the middle of the very convex outer surface granulose, with two rounded tubercles at the anterior extremity; the opposite or inner face nearly flat. In all specimens preserved with the members in place, the meropodite is flexed at a right angle with the carpopodite.

Measurements of propodite, in millimeters.

	Length.	*Length exclusive of finger.*	*Width in the middle.*	*Thickness.*
(*a*)	—	29	19	9.5
(*b*)	25	18	11	6

The left chela of another specimen measures: Total length of propodite 27, palmar surface (without finger) 20 mm.; width in middle 13 mm.; greatest length of carpopodite, measured obliquely 20, or from middle of distal to middle of proximal margin

14 mm.; width in middle 12 mm.; length of meropodite 13 mm. (No. 10,095 Wagner Free Institute of Science, collected at Crosswicks, N. J., by Dr. Thomas H. Montgomery, Jr.).

Lower Marl beds of New Jersey, Lenola (C. W. Johnson, Louis Woolman, H. C. Borden); Crosswicks (Dr. Thomas H. Montgomery, Jr.); Tinton Falls, Monmouth county (Coll. A. N. S.). Also Delaware, deep cut of the Delaware and Chesapeake canal (Coll. A. N. S.). Types in Coll. A. N. S.

What *Callianassa faujasi* is in Europe to the Mæstrichtien, *C. mortoni* is on this side of the Atlantic to the "Lower Marl" beds. It is an abundant species, known by remains of over one hundred individuals, chiefly the propodites only, though sometimes the meropodite, carpopodite and propodite are preserved in place; when this is the case, it is usually due to their being more or less imbedded in hard nodules. The abrupt deflection of the hind margin of the more convex face of the propodite, and the downward bend, posteriorly, of its upper margin (as in fig. 3) are characteristic of the species.

Both chelæ of a Lenola individual preserved in one nodule show the right claw to be somewhat the larger. Otherwise the two claws seem to be counterparts. I can find no other difference.

The largest specimens show a shallow, vermiculate wrinkling of the surface, but the smaller are almost smooth to the eye or touch. The crenulation of the margins becomes stronger with age, and is occasionally lost or obscured by chipping of the edges.

It is named for Samuel George Morton, one of the earliest explorers of the American Cretaceous.

Callianassa conradi n. sp. Pl. I, figs. 8, 9, 10.

Propodite rhombic, its length (without finger) not much exceeding the width, somewhat more convex on the outer than on the inner face, *the posterior margin neither abruptly nor deeply deflexed.* Surface smoothish, with some small tubercles on each side of the slight excavations on both sides of the hand near the commissure between the bases of the fingers; the acute lateral edges crenulated, as in *C. mortoni*, but the lower edge is not deflexed posteriorly as in that species. *Fixed finger triangular in section*, the angles crenulated, the flat grasping face with a short smooth rib near the base, which joins the keel along the outer angle of the finger.

Measurements of propodite.—Length about 30 mm.; exclusive of finger 18.5; width 16.5; thickness 7.6 mm.

Crosswicks and Monmouth county, N. J., with *C. mortoni* (Coll. A. N. S.).

In a few specimens the dactylopodite remains as a short stump only. No carpopodite or other part is known. Thirteen propodites, probably belonging to as many individuals, are before me, the most perfect being one of two in the collection of the Wagner Free Institute of Science.

The claw of *C. conradi* differs from that of *C. mortoni* in being much shorter and broader; more evenly convex on the two sides, the posterior margin of the outer side and the keel along the upper edge are not abruptly deflexed behind; the fixed finger of the propodite of *C. conradi* has no median tooth on its grasping face, which is flat with a short smooth ridge and bounded by two crenulate angles, while in *C. mortoni* there is a median tooth, a crenulate ridge on the face, and no crenate angle along the lower inner part of the finger.

The name is in honor of Timothy Abbott Conrad, the ablest of the early expositors of the Cretaceous and Tertiary faunas of the United States.

Figured type in collection of the Wagner Free Institute of Science, No. 5,478 W.

HOPLOPARIA McCoy.

The following species are referred to this genus with due reserve, as until the cephalothorax is known their exact position in the Astacoid series must remain doubtful. The *specific* characters of the fossils, however, may be readily appreciated; and the definition of the species may call attention to the matter and lead someone to search for the missing parts.

Hoploparia gabbi n. sp. Pl. I, figs. 11, 12, 13, 14.

Right propodite robust, evenly convex on both sides, but slightly more convex above than below, the surface slightly roughened everywhere by small flattened, separated, scale-like asperities; lower margin bluntly angular and marked by a slight groove; upper margin narrowly rounded, bearing a couple of short conic spines, inserted slightly below the edge and directed downward and forward; and on each side there is a rounded tubercle at the base of the dactylopodite. Fixed finger rather slender, with a series of coarse tubercles (worn flat) along its grasping edge.

Dactylopodite armed with a short conic spine near its base (continuing the row of similar spines on the upper margin of the propodite), its grasping face with a series of coarse tubercles, worn flat.

Carpopodite (?) irregularly cylindrical, gibbous, a little compressed and faintly grooved along the outer side, bearing a series of several short spines along the inner.

Abdominal somites (Pl. I, figs. 13, 14) with highly arched tergum, the surface punctate.

Lower Marl beds, Lenola, N. J. (C. W. Johnson, Uselma C. Smith); Monmouth county (William Cleburne). Also deep cut of the Delaware and Chesapeake canal.

Cotypes are No. 527 Coll. A. N. S. and 5,941 Coll. Wagner Institute, from Lenola, N. J.

This species is based upon a right hand and group of four abdominal somites in the collection of the Academy of Natural Sciences of Philadelphia, and a right hand and carpopodite (?) in that of the Wagner Free Institute. The fixed finger is broken in both specimens, and the proximal portion of the hand is wanting. In the Wagner Institute specimen the base of the dactylopodite remains.

A much smaller propodite from Monmouth county, N. J., shows a series of four short spines along the upper margin; but perhaps this specimen belongs to an allied but distinct species, as it is much less convex inside than the larger claws. In the large specimens from Lenola only the anterior two spines remain, as described above, owing to the loss of the posterior portion of the hand.

On account of the mutilated condition of the remains, measurements cannot readily be given; but an Astacoid somewhat larger than the common Eastern crayfish is indicated. The figures are of the natural size. The high arch of the abdomen may be partly due to lateral compression. Until further remains come to light, and especially the cephalothorax, the generic position of the species will be uncertain. It is named in honor of William M. Gabb.

Hoploparia gladiator n. sp. Pl. I, figs. 15, 16.

Propodite long and narrow, parallel-sided, its thickness more than half the width, about equally convex on the two sides, smoothish, showing scattered punctures and under a lens a very fine punctulation; on both sides of the hand a row of three or four small pointed tubercles runs lengthwise along the median convexity; lower edge bluntly biangular. Fixed finger nearly double the width of the dactylopodite, pyriform in section, with a row of tubercles along the grasping edge. Dactylopodite oval in section, also bearing pointed tubercles opposed to those on the fixed finger.

Length of propodite as broken 35 mm.; width 11.5, thickness 7 mm.

Lower Marl beds, Lenola, N. J. (Charles W. Johnson). Deep cut of the Chesapeake and Delaware canal (Coll. A. N. S. P.).

Types are No. 10,120 Coll. Wagner Free Institute of Science, and consist of an imperfect propodite with broken dactylopodite in place, a fragment of the fixed finger, apparently of the same specimen, and a fragment of another hand of larger size, width 14, thickness 9 mm. They were exposed by breaking hard nodules which occur in the clay at Lenola. Another broken propodite is in the collection of the Academy from the deep cut of the Chesapeake and Delaware canal, in Delaware.

The species is readily recognizable by the long, narrow shape of the hand and the minute punctulation of the surface, the biangulate lower edge of the fixed finger and hand, etc. It can hardly be the smaller chela of *H. gabbi* on account of the different surface-sculpture, etc.

BRACHYURA (?)

Remains of three crustaceans, probably short-tailed crabs, are contained in the collection of the Academy, but while *specifically* characteristic by their peculiar sculpture, they are too fragmentary to admit of generic reference, at least from my knowledge of the group.

One fragment shows keels on a smooth surface, somewhat like the hand of *Callinectes*, though it is probably something very different.

Another (Pl. I, fig. 17) seems to be the finger of some very long-handed form. It has three rows of long tubercles along the grasping (?) face, three of smaller ones along the rounded and narrower outer margin, while a furrow runs along each side. This and the preceding are from Monmouth county, N. J., but other fragments, probably referable to the long-fingered crab, are in the collection from Crosswicks, N. J.

Still other fragments (Pl. I, fig. 18) are strongly spinose. I take that figured to be a portion of a hand from which the fixed finger has been broken off at the position marked *f*. The opposite side bristles with three irregular rows of short spines, while smaller ones are scattered over the palm. The socket for the dactylopodite is very large.

These fragments are so strongly marked and easily recognizable specifically that I call the species *Cancer* (?) *whitfieldi;* the generic reference being admittedly merely provisional and to call attention to the necessity of examining further material; for it would be a *Cancer* only in the Linnæan limits of that genus. These fossils are from Burlingtor county, N. J. The name is for Prof. R. P. Whitfield, whose volumes upon the paleontology of New Jersey have been of great use to workers in this field.

There are also some densely granulose remains of portions of limbs, possibly referable to *Hoploparia* or *Astacodes*, in the collection of the Wagner Institute from Lenola, N. J.; but they are too imperfect to afford data of value at present.

EXPLANATION OF PLATE I.

Fig. 1. *Callianassa mortoni.* Right propodite, outside. 2. Right propodite, inside; the fingers broken off. 3. Right propodite, profile from above. 4. Right propodite, posterior view. 5. Right carpopodite, inside. 6. Right carpopodite, outside. 7. Left meropodite, outside (No. 4,059 W, Coll. Wagner Inst.).

Fig. 8. *Callianassa conradi.* Left propodite, inner face (No. 5,478 W, Coll. Wagner Inst.). 9. Left propodite, posterior view. 10. Left propodite, profile.

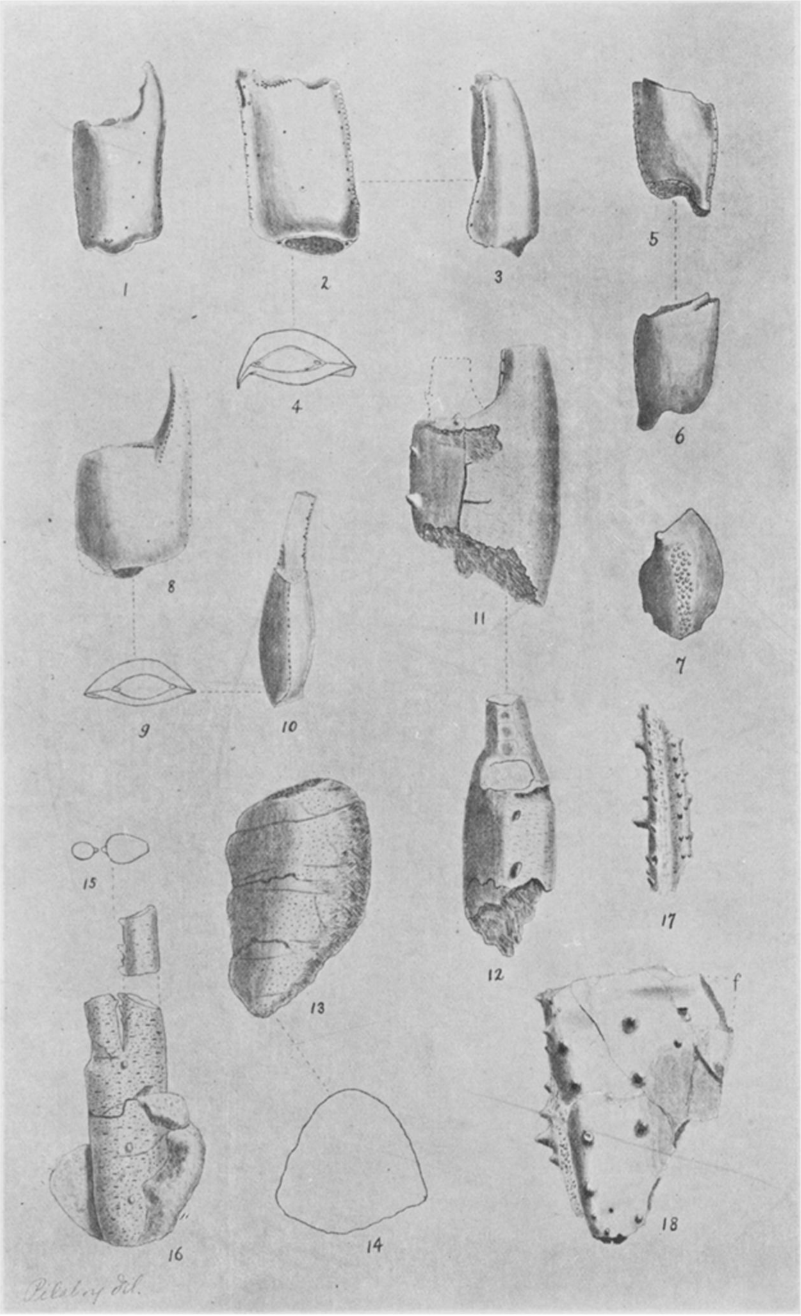
Fig. 11. *Hoploparia gabbi.* Left propodite, outer face; the dactylopodite supplied from another specimen. 12. Left propodite, profile. 13. Portions of four abdominal somites. 14. Section of anterior end of same.

Fig. 15. *Hoploparia gladiator.* Outlines of broken fingers of the large fragment (fig. 16) (No. 10,120 Coll. Wagner Inst.). 16. Propodite, with dactylopodite.

Fig. 17. Fragment of a finger (?), species unknown.

Fig. 18. *Cancer* (?) *whitfieldi.* Fragment of a propodite.

Figs. 1–4, 11–14, 17, 18 are from specimens in the collection of the Academy. Figs. 5–10, 15, 16 are from specimens in the collection of the Wagner Free Institute of Science.



PILSBRY. CRUSTACEA OF THE NEW JERSEY CRETACEOUS.